Electron Hydroelectric Operations Water Quality Monitoring Plan (HOWQMP) - *DRAFT*

April 11, 2022

Project Location
Electron Hydro, LLC
19318 Electron Rd E.
Orting, Washington 98360

Corporate Office Location
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1800 James St. Suite 201
Bellingham, Washington 98225

Hydroelectric Operation Water Quality Monitoring Plan Review and Amendment

In accordance with Department of Ecology (Ecology) Administrative Order #19624, this plan in its final form is approved by Ecology as the Hydroelectric Operation Water Quality Management Plan (HOWQMP) for the Electron Hydroelectric Project (Project). Any amendments to this plan will require prior approval from Ecology before implementation to the plan. If an amendment be approved, the plan shall be updated to the most accurate version of the document and logged in the table below.

Summary of HOWQMP Amendments

Amendments	**Section and Page Number**	**Person Making Changes and Date**	**Ecology Approval – Name and Date**

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1.1. Facility Information and Contacts

1.1.1. Emergency Contacts and Notifications

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Project Manager – Adam Cleveland
Phone: 360-746-3421

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Agency contacts:

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1.1. Administrative Order

Washington State Department of Ecology Administrative Order No. 19624 (AO) requires Electron Hydro, LLC develop a plan to document the quality assurance for water quality monitoring for temperature, turbidity, and toxic substances, as well as track the performance and maintenance of Best Management Practices (BMPs). The AO requires a water quality monitoring plan for these water quality parameters and to demonstrate hydroelectric operational impacts do not negatively impact State Water Quality Standards (90.48 RCW and 173-201A WAC). See AO for details (Appendix A). This Hydroelectric Operations Water Quality Monitoring Plan (HOWQMP) fulfills the requirement.

1.1.1. Objectives

- Satisfy all conditions of the Administrative Order No. 19624
- Determine if hydroelectric operational impacts are in compliance with Washington State Water Quality Standards
- Provide quality assurance that data collected was done to specifications and reported appropriately, by identifying specific locations and methods for sampling water quality for temperature, turbidity, and toxic substances
- Provide specifics for all reporting requirements
- Document the performance of BMPs used in hydroelectric operations by monitoring water quality

This HOWQMP provides quality assurance that the monitoring shall be conducted to provide accurate data and identifies the appropriate parameters to be monitored, including a monitoring schedule, locations, sampling procedures, and reporting requirements.

1.2. Introduction and Background

This HOWQMP is a subsidiary plan to the Water Quality Management Plan (WQMP) for the Electron Hydroelectric Project (Project). Additional subsidiary plans of the WQMP include a Sediment Management Plan (SMP) and a Toxic Substances Plan (TSP) that each detail how sediment practices and toxic substances will be managed for the Project. The HOWQMP serves as the plan to provide quality assurances for monitoring water quality parameters that may be affected by the Project operations and document the AO's conditions for monitoring.

1.2.1. Project Overview

Electron Hydro, LLC (EH) owns and operates the Project on the Puyallup River in Pierce County, Washington. The Project is located on the upper mainstem Puyallup River in Pierce County near the town of Kapowsin. The Project utilizes up to 400 cubic feet per second (cfs) from the Puyallup River at River Mile (RM) 41.7 to generate up to 26 Megawatts (MW) of electricity, enough power for 20,000 homes.

1.2.2. Puyallup River Hydrologic Summary

The Puyallup River and its largest tributaries, the Carbon and White rivers, originate at high elevations on the west and north slopes of Mt. Rainier, within Mt. Rainier National Park. As a rain, snowpack and glacier-fed system, the Puyallup River typically experiences two seasonal peaks, a large peak in the early summer in response to snowmelt and a smaller peak in the late fall in response to rainfall. Glacial meltwater maintains baseflows in the mainstem and causes high turbidity levels in the Puyallup River during summer and early fall periods. It has been estimated that 980,000 tons of sediment flows from the headwaters to the mouth of the river each year (USGS, 2011).

Discharge recorded at the USGS 12092000 gage plotted in Figure 1 is from 1985-2015 civil years. Peak events typically occur over the winter with summer baseflow supported by snowmelt. The lower flow times of the year are in early spring and fall when conditions are dryer. The Projects hydraulic capacity of 400 cubic feet per second (cfs) is supported nearly year-round with a plant capacity factor of 82 percent. The daily average flow 1985-2015 is shown as a solid black line. The charts abscissa only goes to 4,500 cfs which is the approximate magnitude of the 2-year recurrence event.

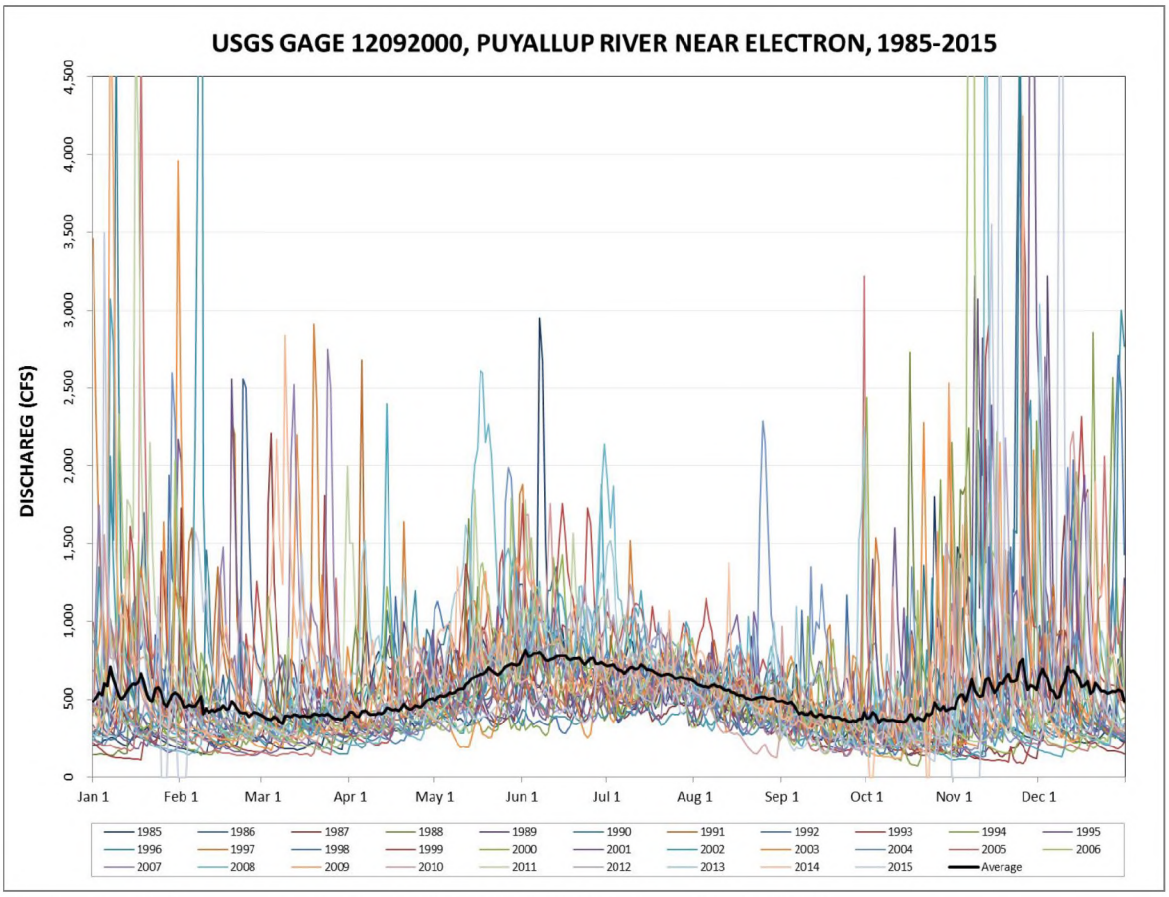

Figure 1 – Hydrographs for the USGS 12092000 Gage, 1985-2015.

1.2.3. Background Narrative for Overall Project

The Project has been in operation since 1904. EH, which acquired the Project in 2014, operates the Project to supply a renewable source of energy to its market in Pierce County.

Water enters the Project at the Headworks located at RM 41.7, where it is diverted into a 10-mile Flume passes through a mid-course Settling Basin and flows into a Forebay. Four Penstocks exit the Forebay and deliver water to the Powerhouse with 873 feet (ft) of head. The water exits the Tailrace (return flow) to the Puyallup River at RM 31.2 (See Attachment: Monitoring Locations Map for Project locations)

The Project has no significant water pool storage above the diversion and is operated as a run-of-river project. Since taking ownership of the Project, EH continued to operate the Project as the previous owner, Puget Sound Energy (PSE) had historically. The Project generally operated continuously throughout the year except for planned maintenance outages and during emergency outages.

Operating the Diversion affects instream flow in the approximately 10.5 miles of the Puyallup River (the "Middle Reach") that bypasses the Intake and Flume and remains in the river. At times high river flows will overwhelm the Diversion structure topping over the entire crestline, sweeping sediment and woody debris downstream. During hydroelectric operations the Diversion has been operated by The Electron Hydro Powerhouse Office or remotely by EH operators. The Diversion has a manual override to control water levels of the Flume with a tainter gate.

One of the issues that EH looks to address is the uptake of bedload with the water for the Project. Previously the water would be transported along with the bedload to the Settling Basin, depositing sand and gravel, which was excavated from the basin floor and deposited on the adjacent property in stacked piles. This added bedload decreases the efficiency of the Powerhouse as well as the increases the maintenance requirements for the Project (i.e. removing built up sediment from the Settling Basin and periodically the Forebay Reservoir).

Major planned improvements will address the need to pass increasingly higher sediment volumes as well as establish and maintain fish exclusion, i.e. keep fish from entering the water delivery Flume and return them to the river immediately below the Headworks instead.

Currently, the Project, under judicial order, is not operating until EH attains a Section 10(a)(1)(A) of the Endangered Species Act (ESA) for an Incidental Take Permit (ITP). EH is drafting a Habitat Conservation Plan (HCP) to support an application for an ITP.

In parallel, EH is drafting permits necessary for upgrading the Headworks with the improvement plans forsediment exclusion and install fish exclusion screens to meet fisheries and ESA standards and requirements.

Permits will include the construction of a Bladder Spillway (Phase I) which will facilitate bedload movement at the Intake of the Project, as well the addition of Fish Exclusion screens (Phase II) as part of two-phase project at the Headworks.

It is intended by EH to put forth as much planning in advance to minimize any potential amendments to this plan, however the conditions of the new permits and licenses are undefined at this time, upon the conclusion and timing of these new conditions for the Project, this monitoring plan may necessitate amendments based upon those conditions. In addition to developing an HCP for the Project, EH intends to finish remaining in-water work for phase one of the two phase project to install fish screens at the Project's Headworks. EH is working on the design for phase II fish screens to protect ESA fish species and increase the ability to limit sediment uptake into the facilities.

1.2.4. History of Electron and Water Quality Monitoring

The Project has operated as a run-of-river project since 1904. The Project represents a substantial living history lesson in the imagination, engineering, and willpower of the early settlers and their technology. There are few facilities that continue to operate as originally intended for such a long period of time. Elements such as the train on top of flume to service the flume pre-date the automobile, yet ultimately have had a lower impact and longer service life. The turbines and generators are the original equipment and are still functional. Electron began operations in 1904 under the ownership of Puget Sound Energy (PSE).

The Project was established prior to the passage of the Federal Water Power Act (June 10, 1920). The Project is not subject to licensing by the Federal Energy Regulatory Commission (FERC).

One of the major issues that faced the Project was the passage of ESA listed fish species. In 1997, PSE and the Puyallup Tribe of Indians (PTI) entered into a fisheries Resource Enhancement Agreement (REA) to address some of the adverse effects of Project maintenance and operations on fish and other aquatic resources. In 1998, under the terms of the REA, PSE constructed a Transfer system to improve downstream fish passage and survival of juvenile salmonid species that become entrained in the Project Headworks and transit the Flume to the Project Forebay. The Transfer Facility enabled operators to transport fish from the Project Forebay to downstream of the Powerhouse to avoid exposure to the penstocks and powerhouse turbines which would otherwise kill them. Shortly after the Transfer Facility was completed, Puget Sound Chinook salmon were listed as "threatened" under the ESA on August 2, 1999, followed by Bull trout on November 1, 1999.

In 2000, PSE built a fish ladder under the REA, enabling upstream fish passage at the Project Headworks for the first time since the Project began operating. The ladder provides access to additional river and tributary habitat above the Headworks. Subsequently, Puget Sound Steelhead trout were listed as "threatened" under the ESA in 2007.

In the summer of 2020, EH continued a construction project as part of a two-phase project to install fish exclusion screens at the Headworks. Phase I consisted of in-water work to replace a portion of the 1903 spillway with a rubber bladder spillway that will improve the function of handling natural bedload movement and hydraulics for the facility that supports the efficacy of the fish screens.

During July/August 2020 construction a stop work order was issued following the discharge of turf and crumb rubber into the Puyallup River. This was caused by the rupture of a high-density polyethylene (HDPE) liner, which was used in combination with the turf as a liner for a temporary cofferdam for the in-water work. EH immediately put forth efforts to clean up and remove plastic turf in the Puyallup River downstream of construction. EH worked with agencies to stabilize the site in preparation for high flow events that occur during winter months. EH was permitted to install a temporary rock fill dam to replace the portion of the spillway that was removed during construction, work was completed for the season in November 2020.

In the summer of 2021, EH conducted a Fish Passage Enhancement Project at the Headworks at the request of the National Marine Fisheries Service. The project was successful in facilitating fish passage at the Headworks. Actions that were accomplished with this project included:

- Building a river gravel cofferdam for in-river work,
- Repairing and Re-decking the wooden spillway,
- Cleaning out fish ladder cells,
- Reestablishing downstream connection channel directly downstream from wood spillway, to connect the left channel and the fish ladder – per request by National Marine Fisheries (NMFS),
- Lowering the crest of the wooden spillway,
- Moving the cofferdam from right to left channel (designed to overtop at 3,000 cfs), and
- Rock spillway reinforcement.

The 2021 work used an Ecology approved Water Quality Monitoring Plan, similar to the Administrative Order Corrective Action Requirement 2, B. 3. Water quality monitoring of all in-water and above-water work.

1.2.4.1. Historic Sediment Management

Historically the Forebay Reservoir has acted as a detention area for water for sedimentation. The Forebay Reservoir is a man-made reservoir at the downstream end of the flume. To address the excess sediment, build up in the Forebay, periodic operational shutdowns would occur to clean out the excess sediment by closing the tainter gate at the intake to stop water flow and drain the Forebay of water through the penstocks. During the shutdowns the Forebay would be dredged to remove the excess sediment which was stockpiled and compacted on an adjacent laydown area for the sediment (see Attachment 4).

In efforts to further manage sediment, a Settling Basin was constructed approximately four miles downstream from the Headworks to reduce the velocity of the water in the flume to allow for settling of sediment. The Settling Basin was constructed with a gate valve as a means for draining the basin. This worked for water as well as sediment removal. Through the REA in 1997, this gate valve was approved for operation during conditions when the Bypass reach of the river had a minimum of 500 cfs.

Routine practice for sediment management at the Settling Basin consisted of dredging the Settling Basin floor of excess accumulated sediment, which was deposited on the adjacent property. EH has continued this operation of dredging the excess sediment from the basin as PSE had done (See Attachment 5)

In February 2020, a landslide occurred next to the Settling Basin of the Project. The landslide consisted primarily of the sediment stockpile adjacent to the Settling Basin. The slide was a great lesson in the need for improving the management of sediment for the Project. Since the Puyallup River is glacially fed, it has naturally high sediment loads that move down the river annually. There is an annual average of 980,000 tons of suspended sediment load in the Puyallup River, with a varying range of 250,000 tons to 1,700,000 tons (PCC Farmland Trust, 2016). After investigation, the slide did not discharge sediment into the Puyallup River. However, EH will continue to monitor for signs of movement of the slide area. The improvements to reduce sediment uptake at the Headworks is intended to eliminate the need for further stockpiling of accumulated sediment from the basin. *See* Figure 5 Settling Basin map for details. EH will have a sediment management plan that meets the conditions of the AO, see the sediment management plan for management details going forward in the Water Quality Management Plan.

EH continued to operate the Project following the practices of operation of PSE with both sediment management and the transfer of fish downstream of the Project through the trap and haul program up until July 2020. No additional water has been diverted at the Intake since that time.

1.2.4.2. Historic Toxics Substances Spill Events

Historically there are two accounts of toxics substances spill events. One was on March 13, 2017 where EH staff noticed a hydraulic oil sheen in the Project's Forebay. It was estimated less than one quart of hydraulic oil (Ecoterra) was leaked onto the soil. Containment was readily deployed and to prevent sheen from leaving the contaminated area, it should be noted that the hydraulic oil used has biodegradable properties sourced from Ecoterra. The second incident occurred on July 30, 2018 where a hydraulic hose fitting cracked while under load and thus sprayed approximately a half gallon of hydraulic oil (Ecoterra See attached Incident Reports (Appendix 7) for both spill events.

1.2.5. Current Practices

Upon taking ownership of the Project, EH is taking the unique opportunity for renewed efforts to address conservation of listed species and to adjust to future potential climate change. The Mt. Rainier and Puyallup watershed vicinity anticipates warmer temperatures with more precipitation on average over the years. Some of the biggest considerations for the Project are continuing to conserve the natural resources that have potential to be impacted by the Project: water and fish.

EH intends to go forward with future improvements for the Project, which includes sediment and fish exclusion facilities at the Headworks that will reduce the overall Projects impact on fish and reduce the uptake of sediment from the river.

Currently, the Project is in a non-operative mode, meaning that the Project is not diverting water at the Headworks into the Project. EH is in the process of completing the fish exclusion screen design and HCP for the Project.

The intent of the construction project is to install fish screens and sediment exclusion at the Headworks, which will greatly reduce the amount of sediment accumulation at the Settling Basin and Forebay. With this, EH does not intend to use the gate valve for controlling drainage at the Settling Basin.

As the phase II of the construction project is still under design and permitting, further description is limited until design is completed. However, the preliminary intent of the construction is to screen out fish (especially ESA listed species) with appropriate fish screens, which will also prevent larger sediment particulates from entering the flume. The water that enters the Intake and returns fish and sediment to the river would remain below the Ordinary High-Water Mark (OHWM).

The design for the rubber bladder and the fish exclusion system at the Headworks is still under preliminary design, the following paragraph below is a conceptual description of the intended design.

The rubber bladder will operate as a control for water diversion for the intake while also allowing for the pass through of sediment from upstream to downstream of the diversion. While the bladder is inflated there would be a pooling of water upstream slowing sediment and allowing for accumulation upstream of the Diversion and the Intake. During high flow events the bladder would be lowered to an elevation lower than the Intake to facilitate natural bedload movement and pass sediment downstream with water velocities that transport sediment. This sediment will naturally move during higher flow events downstream and past the Diversion. Sediment passed downstream would continue to move naturally like it does in all other reaches of the Puyallup river. Sediment that does enter the Intake will be returned downstream of the diversion through the same system that returns fish to the river. Sediments that pass through the fish exclusion system will, once returned to the river, move downstream as natural bedload during higher flow events. Together the replacement spillway and the improvements to the diversion will allow for minimal impact to the river and allow for changing river flows to transport the glacial till downstream during high flow events which occur in the river frequently.

EH is projected to complete the HCP by 2022 and begin work on phase II construction, which would be anticipated to be completed by late 2023.

1.2.6. List and Description of Water Quality Monitoring Areas

1.2.6.1. Headworks

The Headworks are located at RM 41.7. The Headworks encompasses a river diversion structure and adjacent (left bank) Intake for the uptake of river water into the facility (left bank) and a 250 ft long fish ladder (right bank). Additionally, there is supportive facilities in the upland adjacent to the Headworks. These include maintenance and operational buildings as well as the flume that conveys the water from the Intake downstream for the Project. See Attachment 2 for details.

1.2.6.2. Bypass Reach

The Bypass Reach is the approximately 10.5 miles of the Puyallup River that goes from downstream of the spillway at the Headworks to the Powerhouse at RM 31.6. This section of the Puyallup River has no man-made facilities. *See* Bypass Reach Map for details. See Attachment 1 for details.

1.2.6.3. Settling Basin

The Settling Basin is a man-made basin approximately 4 miles downstream from the Headworks, built to reduce velocity of water passing along the flume to reduce transport of sediment load. There is a laydown yard for periodic stockpiling of materials as well as a historic maintenance shack located adjacent to the basin.

There is a drain valve for the basin that releases to the river. This valve was used historically to drain the basin of water. Currently the valve is not intended to be used. See Attachment 4 for details.

1.2.6.4. Upper Campus/Forebay Reservoir

The Upper Campus or colloquially coined the Forebay (Attachment 4), consists of the Forebay Reservoir, a man-made lake for minimal water storage. The Penstock Gatehouse (Gatehouse), which houses the headworks for four (4) penstocks, is located on the north end of the reservoir. The penstocks feed water down the adjacent hill into the Powerhouse. Maintenance and emergency drawdowns previously occurred approximately every five years. During the drawdowns, water is drained through the penstocks.

In bulleted summary The Upper Campus also features – all features have appropriate containment and secondary containment for fuels and oils:

- a maintenance shed (colloquially coined the Speeder Barn)
- a backup 100 gallon diesel generator next to the Gatehouse
- two 550 gallon Above-Ground Storage Tanks (AST's) each filled with diesel and gasoline, the tanks are double-walled and equipped with a Veeder-Root system
- two storage sheds located next to the Speeder Barn, one shed houses 55-gallon drums of new and used oil. The second shed stores 55-gallon drums of used oil.
- two transformers with a capacity of 100 and 150 gallons are also located at the Upper Campus.
- Stockpile laydown

For any fuels or oils that are stored in the laydown yard are a part of operation and maintenance and have appropriate BMPs for containment (i.e. secondary containment). Additionally, the laydown yard is used for temporary holding if there are contaminated spoil piles using all necessary BMPs to adequately contain the piles until they can be properly disposed of.

1.2.6.5. Powerhouse

The Powerhouse is located at RM 31.6 on the left bank of the Puyallup River. The Powerhouse tailrace feeds directly into the river. There is a 3,955-gallon generator step-up (GSU) transformer next to the Powerhouse which is fenced with a concrete containment area that is drained through an oil stop valve. The EH machine shop is located just downstream of the Powerhouse and next to it is a three-sided shed that contains spills kits and secondary

containment for 55-gallon drums of new and used oil. Approximately 300 feet (ft) downstream from the Powerhouse is a small office building, the River Office. This is the location of the downstream water quality sampling location related to turbidity from hydroelectric operations.

1.3. Water Quality Standards for Surface Waters

Washington water quality standards are promulgated in WAC 173-201A. The waters within the Project area are assigned the following beneficial uses:

- Core Summer Salmonid Habitat;
- Salmonid spawning, rearing, and migration;
- Wildlife habitat; and
- Aesthetic values.

In addition, the Puyallup River reach from the Headworks to the Powerhouse is designated for supplemental spawning and incubation criteria in WAC 173-201A-602.

Based upon these use designations, the following sections describe the applicable surface water quality standards for temperature, turbidity, and oil spill prevention requirements at the Project.

1.3.1. Water Temperature [WAC 173-201A-200(c)]

Washington's numeric temperature criteria are expressed as the rolling seven-day average of daily maximum temperatures (7-DADMAX). This is typically calculated by averaging daily maximum temperatures for three days prior to and three days after each day.

The Puyallup River reach from the Headworks to the Powerhouse is designated as *Core Summer Salmonid Habitat*. The applicable temperature criterion for this designation is 16° C as a 7-DADMAX during July 2nd to September 14th (WAC 173-201A-200).
In addition, the more stringent 13° C criterion (as a 7-DADMAX) for the protection of spawning and rearing applies from September 15th – July 1st (WAC 173-201A-200).

When natural conditions exceed the applicable numeric criteria, human actions may not cumulatively increase the receiving water temperature by more than 0.3° C, as a 7-DADMAX. When the background temperature of the water body is cooler than the applicable numeric criteria, incremental temperature increases from all non-point sources combined may not exceed 2.8° C at any time.

1.3.1.1. Water Turbidity [WAC 173-201A-200(e)]

Turbidity water quality criteria are expressed as nephelometric turbidity units (NTUs). The turbidity criteria for *Core Summer Salmonid Habitat* shall not exceed 5 NTU over background

when the background is 50 NTU or less; or a 10 percent increase in turbidity when the background turbidity is more than 50 NTU.

The turbidity criteria include a provision for mixing zones that is dependent upon stream flow. For streams with flows greater than 100 cubic feet per second (cfs) flow at the time of construction, the point of compliance shall be a maximum of three hundred (300) feet downstream of the activity of in- and near-water work. Waters with flows between 11-100 cfs have a compliance point at a maximum of two hundred feet downstream and flows of 10 or less have a compliance point at a maximum of one hundred feet downstream.

1.3.1.2. Toxic Substances [WAC 173-201A-240; RCW 90.48]

Toxic substances shall not be introduced above natural background levels in waters of the state that have the potential singularly or cumulatively to adversely affect characteristic water uses, cause acute or chronic toxicity to the most sensitive biota dependent upon those waters, or adversely affect public health, as determined by the department.

Typical fuels used in or near water for the Project include volatile ("gasoline") and semi-volatile ("diesel") petroleum products, denoted as Gx and Dx respectively. State Laws have a zero (0) permissible amount introduced to waters of the state for both Gx and Dx.

1.4. Water Quality Monitoring Plan

1.4. Water Quality Monitoring Plan

1.4.1. General

The Washington Department of Ecology issued the Administrative Order (AO) on June 8th, 2021. The AO set forth corrective actions for the Project that includes monitoring of pertinent water quality parameters listed in this plan for a continuous five (5) year period. The intent of the water quality monitoring is to demonstrate compliance with Water Quality Standards (WQS). If the Project complies with water quality standards, Ecology will provide concurrence based on water quality monitoring results.

Water quality parameters that will be monitored include temperature, turbidity, and visual monitoring for fuels and oils.

Currently the Project is in a non-operative mode. Monitoring during this period will reflect conditions while the Project is not taking or discharging water from the Puyallup River. Given the current state of the Project, monitoring for turbidity is not necessary until the Project resumes operation, or unforeseen maintenance is necessary (with Ecology approval for said monitoring).

Additionally, for all future in-water work monitoring parameters, schedules, methods, and quality assurance/quality control measures will be described in a project-specific In-Water Work Protection Plan. In-Water Work Protection Plans will be submitted to Ecology for review and approval 30-days (minimum) in advance of all in-water construction.

Ecology will have access to all areas of the Project boundary to conduct site visits, provided there is at least 24 hours advanced notice prior to site visit.

Annual reporting and exceedance reporting may be found in section 1.12 Reporting. Training of staff shall be conducted through a Certified Erosion and Sediment Control Lead (CESCL).

1.4.2. Monitoring Contacts

EH staff Chris Spens and Corey Kleppe will be responsible for providing Ecology with the necessary notifications and results of the water quality monitoring. The monitoring team will include EH staff directed and trained by a CESCL to conduct water quality monitoring for the Project. An EH staff member will be available during monitoring activities to take and report water quality samples and measurements as well as complete the pertinent forms and reports per this monitoring plan. Contact information provided below:

Chris Spens (Director, Regulatory & Environmental Affairs)	(360) 746-3435
Corey Kleppe (Water Quality Program Manager/CESCL)	(808) 859-5655
Adam Cleveland (Electron Hydro Project Manager)	(360) 746-3421

1.4.3. Monitoring Locations

Monitoring locations are based upon AO requirements to provide assurance that the Project's hydroelectric operations do not negatively impact water quality (temperature, turbidity, and toxic substances – specifically) based on the AO's statements for a likelihood that operations may exceed water quality standards. Temperature and turbidity monitoring requirements in the Bypass reach and along the Bypass reach where the landslide occurred was communicated by Ecology on 10/06/2021.
Temperature monitoring shall begin as described in section 1.5.1 with approval of this HOWQMP.

Temperature monitoring locations

Temperature monitoring shall be done at six (6) different locations for the Project.

- Upstream from the Headworks in an active channel or the leading edge of a river bend (US HW) – *Background for Headworks*
- Downstream from the Headworks in an active channel or the leading edge of a river bend (DS HW) - *Temperature point of compliance for Headworks*

- In an active channel or the leading edge of a river bend the Bypass Reach near RM 39.5 upstream of the confluence with Le Dout Creek (Bypass 1)
- In an active channel or the leading edge of a river bend the Bypass Reach near RM 36.5 (Bypass 2)
- Upstream from the Powerhouse in an active channel or the leading edge of a river bend (US PH) – *Background for Powerhouse discharge*
- Downstream from the Powerhouse in an active channel or the leading edge of a river bend (DS PH) – *Temperature point of compliance for Powerhouse*

See Attachment 1 Monitoring Locations Map details.

1.4.3.1. Turbidity monitoring locations

Physical turbidity monitoring will be conducted at two (2) different locations for the Project during operation. including:

- Upstream from the Powerhouse (US PH) – *Background for Powerhouse discharge*
- Downstream from the Powerhouse (DS PH) – *Temperature point of compliance for Powerhouse.*
- Visual turbidity monitoring will be conducted at the Toe of the sand stockpile at the Settling Basin and along the slide area. *

*It should be noted that site conditions do not permit safe access to the Puyallup River as the left bank is a cut bank >10' in height. As of January 2022, site conditions have already begun to naturalize along the slide area.

See Attachment 1 and Attachment 5 for details.

1.4.3.2. Visual monitoring locations for a sheen of gas or oil

Visual monitoring shall be an on-going practice monitoring where all motorized equipment, stored fuels and lubricants are located. Primary location areas would include the Powerhouse and the Upper Campus. See attached visual inspection checklist and Powerhouse and Upper Campus maps for details (see Appendix D). Less frequent, but still monitored areas would include areas where there are stored motorized equipment and fuels or lubricants such as the Settling basin and Headworks for visual monitoring as applicable equipment and contained materials are at these locations. The intent being that monitoring for toxic substances will occur where there is the potential for spills to occur that would negatively affect waters of the state.

1.5. Monitoring Schedule

1.5.1. Temperature

Monitoring for water temperature will occur during the first year based upon Ecology requests from May 1st - October 31st. This window of monitoring shall occur during the first year of monitoring starting May 1, 2022. At the end of the first-year monitoring and prior to the next consecutive monitoring year an analysis of water temperature data shall occur as a part of the annual review of water temperature data. To be included as part of the first-year review, is to assess this monitoring window in relation to 173-201A-200 WAC for salmonid spawning from July 15th – September 15th. Based upon the temperature data an applicable window for monitoring may be proposed and enacted with the approval from Ecology for the next consecutive monitoring year, if a proposed monitoring window is approved this window shall be the set monitoring window through the remainder of required monitoring years, based upon the AO. Approval from Ecology must be confirmed with electronic approval.

Monitoring will be conducted using a temperature logger, set to an hourly interval for temperature data collection.

Weekly inspections will be conducted to physically inspect monitoring locations and to download temperature data. Given the difficult terrain and remote locations of the data loggers, weekly inspections are done to minimize risk of data loss due to fluxing river conditions that may negatively impact or impair data loggers. However, there should be an understanding that unforeseen gaps in data may occur, but EH will make efforts to minimize this risk as prudently as possible. EH proposes a one week data gap tolerance to be permissible as still compliant with the conditions set forth in the AO.

Temperature monitoring shall begin following the approval of this HOWQMP.

Ecology may request for source identification monitoring for temperature if there is an exceedance of temperature criteria in the Water Quality Standards. Ecology may also request changes to temperature monitoring locations based on site conditions new construction at the Headworks.

1.5.2. Turbidity

Turbidity monitoring will occur during sediment generating activities that could incur a potential turbid discharge to waters of the state. At a minimum, physical turbidity monitoring will occur each day during the below defined sediment generating activities:

Sediment Generating Activities:

- Startup of generation
- Draining the Forebay Reservoir
- Cleaning/removal of sediment from the penstocks (occurs as part of Forebay sediment removal process after Forebay Reservoir is drained and built-up sediment is removed from Forebay)

Any unforeseen maintenance activities such as road repair or bank stabilization that would have the potential to create a turbid discharge event would also trigger being a sediment generating activity and thus be monitored as such. If a maintenance activity occurs at a location along the Project at the Powerhouse, what is defined as background shall be a point upstream of any disturbance from the activity and the Point of Compliance shall be as close to 300' downstream of that activity as is safely accessible for monitoring.

Any construction activities that would require permitting from agencies at the Project that would have potential to impact water quality are outside of this HOWQMP and will require additional Ecology approval through a Water Quality Protection Plan (WQPP).

Monitoring will follow the process of sampling at both an upstream and downstream location from the sediment generating activity as defined in 1730201A-200(1)(c) and (e) and 201A-400 WAC. Monitoring during sediment generating activities shall include both recorded visual observations and water sampling for NTU readings.

During non-operation, there are no anticipated sediment generating activities that would cause a turbid discharge to waters of the state, as such there would be no need for continuous data collecting during non-operation. While the Powerhouse is not generating, the water in the Forebay has the potential to overfill during times of increased precipitation and storm events. As a preventative to protect the Forebay and facilities from any environmental threat the penstocks may be used to discharge water from the Forebay to maintain control of the volume of water in the Forebay. This procedure practically is just a pass through of water to maintain water levels in the Forebay. This is not the same procedure as draining the entire Forebay reservoir. This procedure is not likely to produce a turbid discharge, but visual monitoring shall occur prior to discharging, 30 minutes after discharging has begun, and if there is any change in condition to either the Puyallup River or the Forebay while discharging and twice daily for any continued periods beyond a 24-hour period. Visual monitoring shall occur at both at the Upstream monitoring location, the point of compliance of 300' downstream of the tailrace, and at the Forebay. Draining of the Forebay shall cease if there is an observed chance for a turbid discharge until conditions improve for a clean/non-turbid discharge.

During operation, water flows from the Intake to the Powerhouse in a continuous flow. Water velocities are slowed in the Settling Basin and at the Forebay to allow for the settling of any sediment before the water is discharged back to the river.

While operating, excluding any potential sediment generating activity from the Project, the outflow of NTU in the discharge from the Powerhouse is consistently lower than background. The Puyallup River typically has a higher turbidity flow majority of the year, but at lower flows the water becomes clearer as water velocities are slowed and sedimentation occurs. Considering these points turbidity monitoring will be conducted with the following schedule:

Turbidity monitoring during non-sediment generating activities:

a) Twice daily visual monitoring, once at start of working day and a second time during second half of working day
b) IF at any point there is a turbid color change in the Forebay compared to the background upstream of the Powerhouse, physical turbidity monitoring shall occur immediately to measure turbidity readings (NTU) background and at the point of compliance.
    a. IF turbidity does exceed the listed levels, discharging shall cease until the cause of the turbid discharge is identified and remediated. This stop in discharging would then trigger a sediment generating activity when operations start up again and monitor shall adhere to the listed below protocol for sediment generating activity. if applicable an ERTS shall be reported as well.
    b. IF turbidity does not exceed the listed levels then operations shall proceed, and visual monitoring shall continue per this protocol.

Water entering the Project from the Puyallup River has the potential to transport fine sediment from the Headworks to the Forebay, where it has the potential to accumulate and build up sediment deposits. During events for startup of the of Project or when the Forebay requires maintenance from the accumulated sediment there is the potential to either flush or drain from the reservoir through the penstocks and generators and discharge to the tailrace. Given this potential, EH has established a schedule for monitoring for turbidity during such events below.

During potential sediment generating activities, there will be continuous visual monitoring during the activity. Monitoring shall include photo documentation in addition to physical and visual monitoring. Additionally, water samples shall be collected, and the water quality will be evaluated according to procedures described herein. Sampling protocols described below will be initiated for each activity or near water work activity for the day.

Turbidity monitoring during operational sediment generating activities:

c) Two hours prior to start of activity take water samples of background and the point of compliance for the given location, see monitoring locations map for details. Record water sample NTU readings and mark the time of sample taken. See attachment for water quality monitoring form.

d) Following initial sampling, continuous sampling shall occur at fifteen (15) minute intervals until activity is complete.
e) Monitoring at fifteen (15) minute intervals shall continue for an additional 2 hours following the completion of the activity.
f) Turbidity sampling will be collected at background (upstream) and the point of compliance (downstream) for turbidity for these sample intervals.
g) Record water sample turbidity readings (NTU) and the time the sample was collected.
h) IF turbidity does not exceed the listed levels during first hour of work, then collect another sample in 60 minutes, otherwise continue 30-minute intervals
i) IF turbidity does not exceed the listed levels during 3 hours of work, and there is no change to activity or new sediment generating activity to occur then no further sampling is required
j) IF new sediment generating activities begin then turbidity monitoring shall start over again (i.e. Draining of the Forebay, then in second half of day cleaning penstocks, then turbidity monitoring shall start over again following this protocol)

Turbidity monitoring during construction activities with potential for sediment generating activities:

a) Thirty (30) minutes prior to start of activity take water samples of background and the point of compliance for the given location as defined in 1730201A-200(1)(c) and (e) and 201A-400 WAC. Record water sample NTU readings and mark the time of sample taken.
b) Immediately after the start of activity, collect another background (upstream) and point of compliance (i.e. downstream) turbidity sample.
c) Record water sample turbidity readings (NTU) and the time the sample was collected.
d) After 30 minutes of initiating the activity, collect another sample for background (upstream) conditions and at the point of compliance (downstream) of the activity. Record water sample turbidity readings (NTU) and time sample was taken.
e) IF turbidity does not exceed the listed levels during first hour of work, then collect another sample in 60 minutes, otherwise continue 30-minute intervals
f) IF turbidity does not exceed the listed levels during 3 hours of work, then reduce samples to twice per day (start of day & second half of day).
g) IF new sediment generating activities begin then turbidity monitoring shall start over again

BMPs deployed as prevention measures of erosion in the Settling Basin will continue to address potential inputs of soil from the landslide area. See Figure 5 Settling Basin Map for detail. These BMPs will have routine monthly inspections and during these inspections, visual monitoring of the site will occur to evaluate turbid discharge. There will also be inspections of the site following major storm weather events, provided site conditions are safe for monitoring.

Ecology may request changes to turbidity monitoring locations based on site conditions, e.g., natural mixing zone of river downstream of Powerhouse, or based on new construction where any upland activities above the Ordinary High-Water Mark (OHWM) have sediment generating activity.

1.5.3. Toxic Substances

The Project stores gasoline, diesel, and propane as volatile and semi-volatile toxic substances. Motorized equipment with volatile and/or semi-volatile toxic substances and storage of these substances are to be inspected during the routine walk-throughs of the facility and monitored during use when conducting maintenance activities, operations, and construction activities on site.

EH organizes visual monitoring for fuel and/or oil – visible sheens into two categories:

- Prior use of motorized equipment,
- Routine monthly inspections for all Project locations that store equipment, fuel containments, and stockpiles (see Attachments 3 and 4 for details).

Spot check inspections will occur during major precipitation events to inspect secondary containment and BMPs deployed for equipment, fuel containments, and stockpiles.

There will be a monitoring checklist completed during routine monthly monitoring, recording visual inspections for toxic substances (see Appendix D for Monitoring Form).

1.5.4. Hydrologic influence – rain fall, discharge levels in river, weather

The hydraulics of the Puyallup River can be affected by multiple factors. During data collection for temperature and turbidity, data will be recorded for precipitation, discharge levels, and general weather observations for the day of data collection. This information will be collected at the time of data collection for temperature monitoring and during turbidity monitoring activities.

1.6. Monitoring Duration

Water monitoring and samples will be collected, and visual observations will be recorded following the Monitoring Schedule for the duration of five (5) continuous years of complete and reliable data collection that has demonstrated compliance with Water Quality Standards and Ecology has provided concurrence. In accordance with the AO, Ecology may be suspended or modify monitoring requirements after a three-year period, or if any sampling result is in exceedance of water quality standards.

During implementation of the monitoring program, EH will develop operational changes if non-compliance with the water quality standards is demonstrated. Monitoring data, including any water quality exceedances, will be provided in the Annual Reports.

1.7. Non-Compliance

Any activity that is found out of compliance with the provisions set forth in the AO, or conditions that result in any discharge of oil, fuel, or chemicals into state waters, or onto land with potential for entry into state water or cause an exceedance of an applicable water quality criteria is prohibited. Water quality criteria are listed in section 1.3 Water Quality Standards for Surface Waters. If these non-compliance conditions occur, the following steps shall be immediately taken:

- Cease operations at the location of the violation to the extent such operations may reasonably be causing or contributing to the problem
- Assess the cause of the water quality problem and take appropriate measures to correct the problem and/or prevent further environmental damage
- Notify the Ecology Water Quality Compliance Manager of the failure to comply
- Oil or chemical spill events shall be reported immediately to Ecology's 24-Hour Spill Response Team at (800) 258-5990 within 24 hours. Other non-compliance (i.e. turbidity exceedances) events shall be reported to Ecology's Contact at 360-407-6300.
- A detailed written report shall be submitted to Ecology as requested. The report should describe the nature of the event, corrective action taken and/or planned, steps to be taken to prevent a recurrence, results of any samples taken, and any other pertinent information.

For any non-compliance reporting see Environmental Report Tracking System (ERTS) below.

1.8. Materials and Methods

1.8.1. Temperature

1.8.1.1. Equipment/Calibration

ONSET HOBO Prov2 (model U22-001and TidbiT (model UTBI-001) temperature data loggers will be the primary equipment used for temperature data collection. See attached equipment manuals.

Calibration method/timing: Onset Data Loggers do not require calibration. They have nonreplaceable lithium batteries with an average life span of five (5) years. Onset (the manufacturer) suggests that if calibration is necessary that ice bath is the appropriate method for calibration.

Each year prior to initial deployment of each temperature data logger, an ice bath accuracy test shall be done and only data loggers that test accurately shall be deployed. Loggers will then be tethered to an anchor, which will allow the loggers to be suspended in the water column. The depth at which loggers will be deployed may not be uniform across each site, but loggers will generally be deployed to be suspended in the water column.

1.8.2. Turbidity

1.8.2.1. Equipment/Calibration

HANNA Instruments HI98703 Precision Turbidity Portable Meter (Model HI98703) will be the primary equipment used for turbidity data collection.

Calibration method/timing: These data loggers will undergo manufacturer calibration requirements. The manufacturer recommends calibration using supplied calibration solutions that come with the portable meter. It comes supplied with four (4) AMCO standards: <0.1 NTU, 15 NTU, 100, NTU and 750 NTU. Using the three-point calibration method and following the programmed calibration procedure for the meter labeled CAL the meter shall measure the <0.1 NTU standard cuvette and the 15 NTU standard cuvette and the final measurement for the 100 NTU standard cuvette. The meter shall have a quarterly calibration to ensure accuracy and a calibration log shall be kept with the meter to track calibrations.

1.8.2.2. Protocol for collecting turbidity samples

a) Collect three water samples for measurement
    a. Sample collection bottles should be pre-rinsed three times with sample solution (i.e. sample water from monitoring location) prior to reading sample to ensure uniform solution in collection bottle from sample source.
b) Record NTU reading with turbidity meter for each sample (Ensure outside of vials are clean prior to inserting into turbidity meter)
c) Record data in WQ monitoring form.

See Section 1.5 Monitoring Schedule above for sample frequency.

1.8.3. Toxic Substances

EH conducts regular monthly routine inspections (Appendix D for Monitoring Form - Toxic Substance) of all facility grounds and both fuels, lubricants, antifreeze, hydraulics, solvents equipment and containment systems. This includes inspecting each container for any leaks or weeps on the container, valves, seams, pipes, or other structure. Additionally, all secondary containment systems are inspected for any deterioration.

1.8.3.1. Protocol

Should a sheen or spill be observed, the company spill mitigation would be followed. See attached Spill Control Plan.

Also see Table 1, provided by Ecology for the analytic methods for monitoring for toxic substances for Electron activities when there is an observed discharge.

1.8.4. Quality Control and Accuracy

The extent of QA/QC measures will primarily follow manufacturer specifications and procedures for operating monitoring equipment. In addition to these procedures, as applicable, other functions may involve the following:

- Instrument servicing, which may include:
  - Inspection of data loggers and sensor membranes
  - Cleaning, inspection, and replacement (if necessary) of all equipment that cannot be recalibrated or stops operating correctly.
- Instrument Calibration Forms (to document instrument accuracy)
- Standardized field data sheets
- Duplicate Field measurements (to document field variability and precision)

Blank and/or audit samples (field checks on accuracy)

1.9. Water Quality Attainment Plan

EH will, based upon requirements from Department of Ecology's AO #19624, collect water quality data over a subsequent five (5) year period to provide a water quality baseline of project-influenced locations within the Puyallup River Basin. To ensure continued compliance, EH will monitor temperature, turbidity, and toxic substances for potential impacts based on Project hydroelectric operations.

Based on future water quality monitoring results, EH will evaluate corrective actions to maintain water quality standards. For example, if monitoring results indicate that the Project is not in compliance with State criteria for the three parameters mentioned above, EH will notify Ecology (ERTS and the southwest regional compliance manager) and initiate actions (e.g., engineering, or environmental studies) to determine the cause of the problem and develop corrective strategies (e.g., equipment or operational changes) to eliminate or mitigate the water quality issue. Exceedances and any operational changes will be provided in the Annual Report. If appropriate, these measures will be incorporated into a Water Quality Attainment Plan (WQAP) and submitted to Ecology for approval.

1.10. Data Collection and Analysis

Water quality monitoring data will be collected during field visits to the site (see schedule in section1.5). Data will be collected from equipment (how often???) and recorded into EH's internal database. Temperature data will be collected on a weekly basis following the

monitoring schedule in section 1.5.1. Turbidity data will be collected daily following the monitoring schedule in section 1.5.2. This data will be included in Annual Reporting to Ecology.

Any exceedances that occur shall be reported at the time of the exceedance by reporting to ERTS as well as the southwest regional compliance manager (see Reporting section 1.12). The process of evaluating data to assess any impacts, whether they be positive or adverse to water quality will be done after each season of temperature monitoring with a three-month window to collect, record, compile and analyze the data, with the exception of requirements for taking corrective actions for any non-compliances.

1.11. Record Keeping

All field reports will be cataloged and retained for company records. EH will provide information within seven days of Ecology's request. These records will be the source for reporting data to the pertinent stakeholders, specifically Washington Department of Ecology. See Reporting below for details on reporting requirements.

1.12. Reporting

EH will prepare an annual report that summarizes all routine water quality monitoring and identify water quality issues, exceedances already reported, data sheets will be attached, and provide an analysis of the data that evaluates compliance with water quality standards.

This annual report shall be included in the annual report for the Annual Water Quality Management Report (AWQMR). The AWQMR shall be submitted to Ecology on or before January 31st of every year for reporting of January through December, beginning January 31st, 2022.

> Any exceedances of water quality standards will be called in as an Environmental Report Tracking System (ERTS) notification within 24-hours of acknowledgement at 360-407-6300 and the current water quality compliance manager will be notified via notified.

Ecology and EH will meet to discuss and review water quality monitoring data annually.

1.12.1. Environmental Report Tracking System

In addition to the annual and immediate reporting, the following additional notifications are required by Ecology in response to exceedance events and changed conditions:

- High turbidity phone notification – within 24 hours
- Non-compliance notification by phone – within 24 hours
- Non-compliance reports provide written notification – within 5 days of non-compliance

Additionally, phone and written notifications report to Washington Department of Ecology – Environmental Report Tracking System (ERTS)

ERTS Number: 360-407-6300

Additional follow up Ecology contacts:
* Anne Baxter, Water Quality Specialist
(360) 742.97
anne.baxter@ecy.wa.gov

Sheila Marcoe, WQ Unit Supervisor
(360) 522-2987
sheila.marcoe@ecy.wa.gov

1.12.2. Environmental Information Management System (EIM)

EH will in accordance with the AO submit monthly data online to Ecology's Environmental Information Management System (EIM) using Ecology's guidelines found on the website https://ecology.wa.gov/Research-Data/Data-resources/Environmental-Information-Management-database/EIM-submit-data). EIM data will be uploaded annually within one month of the Annual Report submittal.

1.13. Attachments

1. *Monitoring Locations Map*
2. *Headworks Map*
3. *Powerhouse Map*
4. *Forebay Reservoir Map*
5. *Settling Basin Map*
6. *Electron Spill Control Plan*
7. *Hydraulic Oil Spill Incidents*
8. *Onset Hobo data logger manual*
9. *Onset TidbiT data logger manual*
10. *Hanna HI98730 portable meter manual*

1.14. Appendices

1.14.1. Appendix A: Administrative Order #19624 (AO)

1.14.2. Appendix B: Electron Hydro Water Quality Monitoring Form

1.14.3. Appendix C: Electron Hydro Water Quality Visual Monitoring Form

1.14.4. Appendix D: Visual Monitoring Form – Toxic Substances

1.14.5. Appendix E: Monitoring Training Roster

1.14.6. Appendix F: Administrative Order #19624 (AO)